

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

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JUL 27 1999

In re: Matter of

Petition for Rule Making to Make
Available C-Band Spectrum For
Non-Geostationary Fixed-Satellite Service
Gateway Operations in the United States

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RM-9650 FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

To: The Commission

REPLY COMMENTS OF VIRTUAL GEOSATELLITE, LLC

Virtual Geosatellite, LLC ("Virtual Geo"), by counsel and pursuant to Section 1.405 of the Commission's Rules, hereby replies to the Oppositions and Comments concerning Virtual Geo's above-captioned Petition for Rule Making ("Petition"). Specifically, Virtual Geo addresses the Comments of Comsat Corporation ("Comsat"), Comments of GE American Communications, Inc. ("GE Americom"), the Comments and Conditional Opposition of PanAmSat Corporation ("PanAmSat"), the Statement in Opposition to Petition for Rule Making of the American Petroleum Institute ("API"), and Opposition to Petition for Rule Making of Pathnet, Inc. ("Pathnet").

I. Introduction

In its Petition, filed on April 27, 1999, Virtual Geo requested that the Commission initiate a rulemaking proceeding to make available the 5.925-6.725 GHz and 3.7-4.2 GHz bands for gateway operations by non-geostationary ("NGSO") fixed-satellite service ("FSS") systems. Virtual Geo observed that the International Telecommunication Union

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(“ITU”) Radio Regulations provide for NGSO FSS operations in the requested bands, but that Commission action was needed to clarify the availability of this spectrum for NGSO FSS gateway use within the United States. Virtual Geo also demonstrated that such action would serve the public interest by paving the way for full deployment of spectrum-efficient NGSO FSS networks, such as Virtual Geo’s VIRGO system, which would operate service and additional gateway links at Ku-band.

II. The Commission Should Take Into Consideration The Legitimate Concerns Raised By GSO FSS System Operators In Crafting Rules To Govern NGSO FSS Gateway Operation At C-Band.

In their Comments on the Virtual Geo Petition, geostationary (“GSO”) FSS operators Comsat, GE Americom and PanAmSat express concern about the ability of certain types of NGSO FSS networks to operate compatibly with existing GSO FSS systems in the Ku-band service frequencies, as well as in the proposed C-band gateway link frequencies. PanAmSat, for example, states that it opposes the applicability to NGSO FSS systems generally of any rule permitting gateway operations at C-band, but that it does not oppose the Virtual Geo Petition if it is limited to what it terms “Quasi-GSO” networks of the type proposed by Virtual Geo. Specifically, it states that “it appears that acceptable sharing criteria can be established that would permit the operation of Quasi-GSO satellite systems using the C-band,” but that “operation of traditional NGSO systems in the C-band would raise countless, and probably intractable, sharing problems.” PanAmSat Comments and Conditional Opposition at 1.¹

¹ Comsat makes a similar point in its Comments, stating that “[w]hile the analysis of sharing with an NGSO system like the VIRGO system, with its highly inclined and eccentric orbits and repeating ground-tracks, may be relatively straightforward, sharing analysis for systems with other types of NGSO orbits can be more difficult. Comsat Comments at 5.

Similarly, GE Americom observes that GSO FSS operations in the C-band are highly susceptible to harmful interference. More particularly, it states that “the degree of angular separation from the plane in which GSO satellites operate will likely be a critical factor in any Commission analysis of the feasibility of C-band GSO/NGSO sharing,” and the Commission should specifically address this issue in any NPRM. GE Americom Comments at 4.

Virtual Geo agrees with the GSO FSS commenters that the Commission should consider carefully what sort of limits might be necessary for NGSO FSS systems in order to ensure compatible operation with space networks that are currently in operation at C-band (as well as Ku-band). Because of serious questions concerning the ability of certain types of NGSO FSS systems to share spectrum with GSO FSS systems without causing harmful interference – a concern that transcends C-band – it may be necessary, as PanAmSat suggests, to limit operations of NGSO FSS systems to particular orbital configurations. As GE Americom states, this is a question that must be addressed in any Notice of Proposed Rule Making, whether or not the Commission makes a definitive proposal at the outset.

It may be appropriate, in particular, for the Commission to propose as a standard the non-circular Virtual GSO configuration employed by Virtual Geo. Protection of GSO FSS, as well as terrestrial fixed services, is one of Virtual Geo’s objectives and a key element of its VIRGO system design.²

² See, e.g., Application of Virtual Geo for Authority to Launch and Operate a Global System of Non-Geostationary Satellites in Sub-Geosynchronous Elliptical Orbits, File No. SAT-LOA-19990108-00007, at 6 (filed January 8, 1999) (“VIRGO Application”).

III. The Vague Sharing Concerns Raised By Terrestrial Fixed Wireless Interests Are Inapplicable To The Type of Gateway Earth Station Use Proposed In The Virtual Geo Petition, And Pose No Impediment To Adoption Of Virtual Geo's Proposal.

In contrast to the measured and analytical approach taken by the GSO FSS commenters, API and Pathnet, the only members of the fixed service community that filed comments on the Virtual Geo Petition, take a reflexively antagonistic position to the proposal without considering the specific character of the spectrum use involved. These comments are not premised on the substance of the proposal that Virtual Geo has advanced, but seem motivated instead by a strongly-rooted desire simply to block another potential use of the C-band without regard to whether such a use is viable and spectrum efficient. Accordingly, the Commission should reject these objections and move forward with a Notice of Proposed Rule Making.

A. The Narrow, Non-Ubiquitous Nature of NGSO Gateway Earth Station Deployment Proposed For C-Band Does Not Implicate The Concerns Raised By The Fixed Service Commenters.

According to API, use of the 6 GHz band for NGSO FSS gateways “would foreclose large geographic areas to FS, because NGSO FSS earth stations tend to ‘sterilize’ surrounding areas from future use by the FS, resulting in inefficient spectrum utilization.” API Opposition at 5. Pathnet similarly asserts that “permitting NGSO FSS operations in the C-band will decimate any further development of the important FS operations.” Pathnet Opposition at 3.

In fact, these concerns are particularly inapplicable to the type of limited use that Virtual Geo has proposed. By design, NGSO FSS gateways will be sited away from areas of concentrated terrestrial use to avoid interference to either type of facility. Fundamentally, in order to serve their own needs, NGSO FSS operators will want to locate gateways away from

fixed service facilities to maximize their usefulness. In addition, the gateways will be very few in number, and the number of NGSO FSS systems is itself likely to be small.³ Inherent characteristics of gateway use are thus conducive to sharing between these facilities and point-to-point microwave operations.

In addition, with respect to the particular type of NGSO FSS network that Virtual Geo has proposed, the distinct system design incorporates features that ensure an ability to share with existing services. First, VIRGO will be using highly directional antennas that point directly at the satellite.⁴ Second, in the worst case scenario, the receiving satellite will be no less than 40 degrees above the horizon. In the typical case, the antenna will be pointing significantly higher.⁵ The nature of the Virtual GSO configuration thus allows full separation and isolation from the terrestrial fixed service and the GSO FSS.⁶

The claim that fixed service development would be “decimated” by NGSO FSS earth stations is therefore both unsupported and inconsistent with the premise of Virtual Geo’s proposal. Also without foundation is Pathnet’s related concern that it might be necessary to relocate fixed service systems to new frequency bands in order to permit NGSO FSS operations. *See* Pathnet Opposition at 6-7. Given the very limited scope of gateway earth station deployment at C-band, and the ability to isolate transmissions from terrestrial facilities,

³ For example, only six applicants have sought authority to operate NGSO FSS networks at Ku-band, and many of these system types may not be able to operate at C-band due to the interference concerns cited by GE Americom and PanAmSat with respect to GSO satellites.

⁴ *See* VIRGO Application at 84 & 86.

⁵ *See id.* at 15.

⁶ It would be difficult, if not impossible, for NGSO FSS systems that propose circular orbit operation to provide such complete isolation.

there is no prospect that incumbent users would need to move in order to accommodate the new spectrum use.⁷

Finally, Pathnet notes in its Opposition that NGSO FSS earth stations have antennas that move continuously rather than operating from a fixed point. It asserts that even if Virtual Geo's Virtual GSO system design limits this movement, it has not shown that it will provide "any more protection from interference than existing NGSO FSS." Pathnet Opposition at 5. In fact, in the case of the Virtual Geo VIRGO system, the ground antennas are narrow-beamed pointing antennas that follow the VIRGO satellites in their active arc. As noted above, the great advantage of this feature is that the active arc is geometrically isolated from either the geostationary arc or terrestrial fixed service operations. For this reason, the antennas will always be pointing at a minimum of 40 degrees away from these services, and the chance of causing harmful interference is minimal.

B. The Limited Scope of NGSO FSS Use At C-Band Suggests That Artificial Limitations On Earth Station Deployment Will Not Be Required, But This Is An Issue That Should Be Addressed In A Notice of Proposed Rule Making.

Because the proposed use of spectrum for NGSO FSS gateway links does not, in fact, pose the type of threat that API and Pathnet imagine, there is not likely to be a need for imposition of "strict limits . . . to prevent the band from being inundated by NGSOs," as API

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Moreover, Pathnet is misleading in alleging an inconsistency between Virtual Geo's concerns expressed in another rulemaking proceeding about coordinating with the fixed service in the *Ku-band* and its observation that the fixed service and NGSO FSS are compatible and can be coordinated at *C-band*. See Pathnet Opposition at 4. Pathnet is making a classic "apples to oranges" comparison. As Pathnet itself acknowledges, the proposed service at Ku-band over which Virtual Geo expressed concern is a point-to-multipoint service proposed by Northpoint Technology ("Northpoint") that necessarily involves ubiquitous deployment of fixed service user terminals. Northpoint's proposed service also would be located in the primary user band for DBS and NGSO FSS, where widespread deployment of small earth stations for these satellite services is also necessary. In sharp contrast, Virtual Geo proposes to operate only a very small number of gateways at C-band, where the fixed services are point-to-point only. For these reasons, the satellite/fixed service sharing scenario is much easier with respect to the use that Virtual Geo proposes at C-band than it is for the Northpoint proposal at Ku-band.

has suggested. API Opposition at 6 & 7. As detailed above, there is no legitimate prospect of the band being “inundated” by NGSO FSS facilities. Given the limited nature of gateway use, the non-ubiquitous nature of the earth terminals to be used, and the small number of applicants proposing NGSO FSS satellite networks, the demand for construction of such earth stations should be quite small.

In view of the fact that the result that API and Pathnet desire – isolation of a small number of NGSO FSS earth stations from fixed service facilities – is an inherent aspect of the type of spectrum use proposed in the Virtual Geo Petition, most regulatory constraints on antenna number and location would be arbitrary by nature and therefore of little or no value. Measures necessary to ensure successful band sharing can likely be established through coordination involving affected parties, rather than attempting to establish rigid shielding or antenna size requirements. Nonetheless, these are issues for which the advantages and disadvantages can be addressed fully in an FCC-initiated rulemaking proceeding.

C. Use of C-Band Gateway Links Is Necessary And Appropriate for Global Ku-Band NGSO FSS Systems.

As to claims by API that Virtual Geo has failed to explain “why it needs to utilize [the] already heavily encumbered” C-band (API Opposition at 5-6), the fact is that NGSO FSS gateway use of the band already falls within the scope of FSS uses contemplated for C-band. The ITU’s Radio Regulations anticipate use of the C-band frequencies for NGSO FSS gateways, with RR S22.2 providing a regulatory framework for such use.⁸ Accordingly, the band is available on a global basis on these terms.

⁸ See ITU Radio Regulation S22.2, WRC-97 Final Acts at 107 (Geneva 1997).

Because Virtual Geo's VIRGO satellite network will be a global system, it requires gateway links in bands that can be utilized world-wide.⁹ The requested C-band frequencies are the best available option to meet this critical need because they are already used extensively for FSS and are allocated on a global basis. Use of C-band spectrum for gateway operations on the terms proposed in the petition – no degradation in quality of service and no operational constraints for existing users – is an efficient shared use of spectrum that is therefore in the public interest. As discussed above, with the geometric separation that the VIRGO system offers, the C-band frequencies can be reused without affecting the operation or encumbering either of the incumbent services.

Moreover, as noted in Virtual Geo's Petition, FSS use is well-established at C-band and has proven to be very reliable.¹⁰ Thus, there is an existing base of equipment that can be used to meet the needs of NGSO FSS networks.

D. An NPRM Should Be Initiated Expeditiously So That It Can Proceed In Tandem With The Related Ku-Band NGSO Service Rules Proceeding.

Finally, there is no merit to Pathnet's effort to stall action on the Virtual Geo Petition by claiming that it would be premature to consider the request until action is taken in the already-initiated Ku-Band NGSO rulemaking proceeding.¹¹ See Pathnet Opposition at 7-8. Indeed, to the contrary, because both the Ku-band rulemaking and Virtual's Geo's C-band gateway proposal are critical to the successful introduction of NGSO FSS systems in the Ku-

⁹ See VIRGO Application at 8.

¹⁰ See Virtual Geo Petition for Rule Making at 3-4.

¹¹ See *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-band Frequency Range and Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2 – 12.7 GHz and by Direct Broadcast Satellite Licensees and Their Affiliates (NPRM)*, ET Dkt. No. 98-206, FCC 99-284, slip op. (released November 24, 1998).

band, it is optimal for both to proceed in tandem.¹² It would make little sense for the Commission to take final action in the Ku-band proceeding only to delay the finalization of system licenses because it was necessary to initiate an entirely new proceeding on gateway links. The fact that the Ku-band NGSO proceeding is already ongoing is an excellent justification for expediting the process of initiating a rulemaking in response to Virtual Geo's Petition.

IV. Conclusion

Accordingly, based on the foregoing discussion as well as its original Petition for Rule Making, Virtual Geo urges the Commission promptly to initiate an NPRM to establish rules for gateway operations by NGSO FSS systems in the 5.925 – 6.725 GHz and 3.7 – 4.2 GHz bands.

Respectfully submitted,

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This is also the case with respect to any cooperative international studies that may be appropriate with respect to inter-service sharing. See Comsat Comments at 2-4.

CERTIFICATE OF SERVICE

I, Barbara Robinson, hereby certify that a true and correct copy of the foregoing "Reply Comments of Virtual Geosatellite, LLC" was this 27th day of July, 1999, served by first class mail, postage prepaid, to the following:

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